Heat and Thermodynamics

1. What is the difference between heat and internal heat?
2. What is the difference between internal energy of an object and the object’s temperature?
3. Why do some materials have a higher specific heat than other material?
4. Why do some materials have a higher latent heat than other materials? Is there a connection between their melting point and their latent heat?
5. Using conduction, convection and radiation. What could you do to your house to limit the heat transferred out of your house?
6. What is the difference between a reversible process and an irreversible process?
7. What is the 2nd law of thermodynamics?
8. Why is the 2nd law of thermodynamics necessary?
9. Why isn’t the 1st law of thermodynamics necessary?
10. Describe the following 4 types of thermodynamic processes and what is special about each one? ( Isothermal, Isobaric, Isometric, Adiabatic)

Calculations:

1. A 200W microwave runs for 30 seconds on a coffee cup containing 150 g of water. If the water is at 20oC when it is placed in the microwave, how hot is it when it comes out? (pretend that all the microwave oven’s energy is transferred to the water. Ignore the cup or anything else in the microwave)
2. 50g of an unknown, solid substance is placed in an experimental chamber which transfers 1 kcal of heat into the sample every second. It remained a solid for 30 seconds with an initial temperature of 100oC and a final temperature of 150oC . It turned to liquid at 150oC and remained so until it reached 260oC.his took all of 35 seconds.
3. What is the specific heat of the sample material in its solid state?
4. What is the specific heat of the sample in its liquid state?
5. What is the latent heat of fusion for this sample?

3.A pan containing liquid water at 0oC is placed in a room full of 150 kg of air at -10oC. When the water is done freezing, the air in the room is at 0oC. How much water is in the pan? The heat that is transferred to the air comes from the water, so the amount of heat the air gains is equal to the amount of heat the water loses.